

WHAT IS CLAIMED IS:

1. A method of suppressing noise components contained in an input speech signal, comprising:

obtaining an input spectrum by executing frequency analysis of the input speech signal by a specific frame length;

obtaining an estimated noise spectrum by estimating a spectrum of the noise components;

multiplying the estimated noise spectrum by a specific spectral subtraction coefficient;

obtaining a subtraction spectrum by subtracting the estimated noise spectrum multiplied with the spectral subtraction coefficient from the input spectrum;

obtaining a speech spectrum by clipping the subtraction spectrum; and

correcting the speech spectrum by smoothing in at least one of frequency and time domains.

2. The method according to claim 1, wherein the correcting the spectrum includes smoothing speech spectrum elements which form the speech spectrum, using neighboring speech spectrum elements in at least one of the frequency and time domains.

3. The method according to claim 2, wherein the correcting the spectrum includes substituting the speech spectrum elements by a maximum value of the neighboring speech spectrum elements.

4. The method according to claim 1, wherein the correcting the spectrum includes convoluting the speech spectrum using a specific function in at least one of the frequency and time domains.

5. A method of suppressing noise components contained in an input speech signal, comprising:

obtaining an input spectrum by executing frequency analysis of the input speech signal by a specific frame length;

10 obtaining an estimated noise spectrum by estimating a spectrum of the noise components;

obtaining a spectral slope of the estimated noise spectrum;

15 multiplying the estimated noise spectrum by a spectral subtraction coefficient determined by the spectral slope;

20 obtaining a subtraction spectrum by subtracting the estimated noise spectrum multiplied with the spectral subtraction coefficient from the input spectrum; and

obtaining a speech spectrum by clipping the subtraction spectrum.

25 6. The method according to claim 5, wherein a smaller spectral subtraction coefficient is set with increasing spectral slope.

7. The method according to claim 5, further comprising correcting the speech spectrum by smoothing

in at least one of frequency and time domains.

8. A noise suppression apparatus for suppressing noise components contained in an input speech signal, comprising:

5 a frequency analyzer configured to obtain an input spectrum by executing frequency analysis of the input speech signal by a specific frame length;

10 a noise spectrum estimation unit configured to obtain an estimated noise spectrum by estimating a spectrum of the noise components;

a multiplier configured to multiply the estimated noise spectrum by a specific spectral subtraction coefficient;

15 a subtractor configured to obtain a subtraction spectrum by subtracting the estimated noise spectrum multiplied with the spectral subtraction coefficient from the input spectrum;

a clipping unit configured to obtain a speech spectrum by clipping the subtraction spectrum; and

20 a spectrum correction unit configured to correct the speech spectrum by smoothing in at least one of frequency and time domains.

9. The apparatus according to claim 8, wherein said spectrum correction unit smoothes speech spectrum elements which form the speech spectrum, using
25 neighboring speech spectrum elements in at least one of the frequency and time domains.

10. The apparatus according to claim 9, wherein said spectrum correction unit substitutes the speech spectrum elements by a maximum value of the neighboring speech spectrum elements.

5 11. The apparatus according to claim 8, wherein said spectrum correction unit convolutes the speech spectrum using a specific function in at least one of the frequency and time domains.

10 12. A noise suppression apparatus for suppressing noise components contained in an input speech signal, comprising:

a frequency analyzer configured to obtain an input spectrum by executing frequency analysis of the input speech signal by a specific frame length;

15 a noise spectrum estimation unit configured to obtain an estimated noise spectrum by estimating a spectrum of the noise components;

a spectral slope calculation unit configured to obtain a spectral slope of the estimated noise spectrum;

20 a multiplier configured to multiply the estimated noise spectrum by a spectral subtraction coefficient determined by the spectral slope;

25 a subtractor configured to obtain a subtraction spectrum by subtracting the estimated noise spectrum multiplied with the spectral subtraction coefficient from the input spectrum; and

a clipping unit configured to obtain a speech spectrum by clipping the subtraction spectrum.

13. The apparatus according to claim 12, wherein a smaller spectral subtraction coefficient is set with
5 increasing spectral slope.

14. The apparatus according to claim 12, further comprising a spectrum correction unit configured to correct the speech spectrum by smoothing in at least one of frequency and time domains.